

81. Soil carbon sequestration under traditional management of smallholder's oil palm plantations in Sudano-Guinean context

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In the current context of climate change, oil palm plantations are much criticized because they replace large areas of tropical forests. In Benin Republic, located in the Sudano-Guinean region, smallholder's oil palm plantations do not replace forests but old and unproductive croplands. In some of these palm plantations, pruned leaves from the palm trees are deposited to the soil for recycling. A study was conducted in southeastern Benin to evaluate the effect of the input of pruned leaves on soil carbon sequestration in smallholders' plantations. The study area is characterized by a mean annual precipitation in the range 1300-1400 mm. Soils are slightly desaturated ferralsols. Young palm plantations (4-6 year-old), pre-adults (7-12 year-old) and adults (13-20 year-old) were selected. In the young plantations, the leaves pruning is not occurring yet. In the pre-adults and adults plantations, the leaves have been cut down and recycled during respectively 4 years and 10 years, and are totally returned to the soil (TR) on the planting lines and not returned (NR) in the interrows. Nine palm trees were selected in each plantation to estimate the biomass of leaves on the soil surface and the carbon stock in the 0-20 cm soil layer. Leaves biomass amounted 45 and 80 Mg of dry matter per hectare, respectively for pre-adult and adult plantation, corresponding to 22 and 38 Mg C.ha⁻¹. The soil carbon stock in the top 0-20 cm soil layer increased significantly after 10 years of leaves deposits (18.4 Mg C.ha⁻¹) compared to young plantations (16.2 Mg C.ha⁻¹). In the study context, smallholder's oil plantations play a role for greenhouse gas mitigation through the soil carbon sequestration.